The fossil conifers of Spitzbergen.—An important contribution by GOTHAN[10] contains a description of the fossil woods of various geological horizons from the island of Spitzbergen, brought back for the most part by Arctic expeditions during the past 50 years. The most interesting woods from the evolutionary standpoint are those from the Upper Jurassic of Green Harbour, Esmarks Glacier, and Wimansberg. Of these the author remarks: "Es ist überhaupt gemein auffallend, wie häufig man in der Hoftüpflung zahlreicher Hölzer der oberen Juraformation des Nordens Araucarioiden Charackteren begegnet, und dies bei Angehörigen von Familien, die mit den Araucarieen im übrigen sicher weiter nichts zu thun haben" (p. 18). The author holds that strongly pitted rays, together with normal or traumatic resin canals in the wood, are an infallible indication of abietineous affinities. Since most of the woods which he describes in this memoir have these characteristics, he puts them with the Abietineae, in spite of the fact that other apparently more important features are clearly araucarian. It is interesting to note in this connection that SEWARD[11] has referred woods of a similar type from the Upper Jurassic of Yorkshire in England to araucarian affinities. There seems little reason to doubt that SEWARD rather than GOTHAN is right in this matter, especially as it appears from recent studies on the living Araucariineae, as yet unpublished, that these came from ancestors which, on comparatively anatomical evidence and in accordance with generally accepted morphological principles, possessed bars of Sanio in their tracheids, wood parencl yma, opposite pitting, resin canals in the wood, strongly pitted rays, and a clearly double system of ovulate cone scale bundles, all characters unmistakably abietineous. It is accordingly not surprising to find intermingled araucarian and abietineous characters in the araucarian woods of the Jurassic. Moreover, if one admits that GOTHAN'S jurassic woods are in reality abietineous and not araucarian, a grave difficulty arises in the case of recently described woods from the American Cretaceous, such as *Brachyoxylon*, *Araucariopitys*, *Paracedroxylon*, etc., which sometimes have ligneous resin canals and sometimes lack them, and likewise have both the araucarian and the abietineous types of ray, the former being more abundant in these later woods. The facts can all be squared with a derivation of the Araucariineae from the Abietineae, but not with the reversed derivation. The most interesting of the new genera and species described in this memoir are *Protopiceoxylon* (*P. extinctum*, apparently beyond question araucarian), *Protocedroxylon* (*P. araucarioides*), and *Cedroxylon* (sic!) *transiens*. It seems quite clear from this and other publications of GOTHAN on the Jurassic woods of northern Europe that the Araucariineae were at that period not very remote from their abietineous source. It follows

[10] GOTHAN W., Die fossilen Holzreste von Spitzbergen. Kung. Svensk. Vetensk. Handl. **45**: no. 8. 1910.

[11] British Museum catalogue of Mesozoic plants, Jurassic flora. II. Liassic and Oolitic floras of England. *pls. 6, 7*. London. 1904.

that the so-called Araucarioxyla of the earlier Mesozoic have nothing to do with the evolution of the stock from which *Agathis* and *Araucaria* have been derived. *Walchia* and *Voltzia* from the Permian and Trias, moreover, do not present the *Araucarioxylon* type of wood. The situation thus becomes difficult indeed for those who believe the Araucariineae to be the oldest conifers, and to constitute the articulation of the family with the Cordaitales.—E. C. JEFFREY.

Cytology of the Chytridineae.—BALLY,[12] working in STRASBURGER'S laboratory, has added much of importance to our knowledge of the cytology of the Archimycetes. In *Synchytrium taraxaci* the primary nucleus divides, not by mitosis as in *S. decipiens* and *S. puerariae*, which have been investigated by STEVENS and KUSANO, but by a process analogous to nuclear gemmation, in which masses of chromatin originally derived from the nucleolus pass into the cytoplasm as chromidia which later become the basis of the secondary nuclei. While the stages in this process are not fully worked out, there can be little doubt from the figures showing the old primary nucleus still undivided, together with scores of secondary nuclei in the same parasite, but that the description given is substantially correct. These nuclei later divide by mitosis and always have four chromosomes. Curiously enough the conspicuous asters ("karyodermatoplasts") which reconstruct the nuclear membrane in *S. decipiens* and *S. puerariae* appear to be absent from *S. taraxaci*.

BALLY does not follow PERCIVAL[13] in including *Chrysophlyctis* in *Synchytrium*, but he fully confirms and substantiates PERCIVAL'S account of the remarkable amitoses in the resting sporangia of that plant. Here nuclear gemmation reaches its climax. The extruded chromidia never organize secondary muclei, but pass unchanged into the zoospores, which are formed in a most peculiar manner, while the remains of the primary nucleus still persist undivided in the center. Here again more details would be very welcome, but it is clear from the figures, together with those of PERCIVAL, that there is something here far different from the ordinary behavior of nuclei, or better of chromatin, for such cysts may be said to have no nuclei, though rich in chromatin.

In *Urophlyctis Rübsaamenii*, amitosis, largely by nuclear gemmation of which figures showing details are presented, appears to be the sole method of nuclear multiplication. The cytological condition of this plant contrasts sharply with that of the two preceding, in that the parasite becomes coenocytic with the beginning of growth. On the basis of such differences he separates the Archimycetes into two series: one essentially uninucleate, including *Synchytrium* and *Chrysophlyctis;* the other coenocytic from almost the beginning, including the Cladochytriaceae, and more doubtfully the Rhizidiaceae

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[12] BALLY, WALTER, Cytologische Studien an Chytridineen. Jahrb. Wiss. Bot. **50**:95–156. *pls. 1–5. figs. 6.* 1911.

[13] PERCIVAL, JOHN, Potato wart disease: the life history and cytology of *Synchytrium endobioticum* (Schilb.) Percl. Centralbl. Bakt. **25**:440–446. *pls. 1–3.* 1910.